

U.S. Patent Application Serial No. 09/361,610
Amendment dated May 17, 2004
Reply to OA of February 17, 2004

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

C1
cancel
Claims 1-18 (canceled)

1 Claim 19 (currently amended): A digital camera according to claim 18, comprising:
2 an imager including a vertical transfer register having a plurality of transfer areas, a
3 horizontal transfer register connected to an output terminal of said vertical transfer register, and a
4 plurality of light-receiving elements respectively assigned to said plurality of transfer areas;
5 a timing generator connected to said imager, and for applying timing signals to said
6 imager, wherein said timing signals include a first exposure signal for carrying out a first
7 exposure of a first time period, a second exposure signal for carrying out after said first exposure
8 a second exposure of a second time period, which is shorter than said first time period, a first
9 reading signal for reading-out from first light-receiving elements intermittently present in a
10 vertical direction out of said plurality of light-receiving elements to said vertical transfer register
11 first electric charges generated by said first exposure, a second reading signal for reading-out

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12 from second light-receiving elements respectively assigned to vacant transfer areas in which no
13 electric charge is present out of said plurality of light-receiving elements to said vertical transfer
14 register second electric charges generated by said second exposure, a vertical transfer signal for
15 transferring the electric charges read-out to said vertical transfer register in a vertical direction,
16 and a horizontal transfer signal for transferring in a horizontal direction the electric charges that
17 reach said horizontal transfer register by a transfer in accordance with said vertical transfer
18 signal, and wherein said second light receiving elements are intermittently present in the vertical
19 direction, and said first electric charges read out by said first reading signal and said second
20 electric charges read out by said second reading signal are alternately arranged on said vertical
21 transfer register; and

22 a processor for generating one screen of a first image signal based on said first electric
23 charges and said second electric charges output from said imager, wherein said second light-
24 receiving elements are equal to said first light-receiving elements, and said second electric
25 charges are read-out to said vertical transfer register at the same time that a vertical transfer of
26 said first electric charges [[are]] is started or after the vertical transfer of said first electric charges
27 [[are]] is started.

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1 Claim 20 (previously presented): A digital camera according to claim 19, wherein said
2 first light-receiving elements are intermittently present in a vertical direction using successive N
3 ($N \geq 1$) of elements as one unit, and said first electric charges move over a distance
4 corresponding to at least N of the light-receiving elements until said second electric charges are
5 read-out.

1 Claim 21 (currently amended): A digital camera according to claim [[20]]19, further
2 comprising a monitor for displaying an image based on said first image signal.

1 Claim 22 (currently amended): A digital camera according to claim 18, further
2 comprising:, comprising:
3 an imager including a vertical transfer register having a plurality of transfer areas, a
4 horizontal transfer register connected to an output terminal of said vertical transfer register, and a
5 plurality of light-receiving elements respectively assigned to said plurality of transfer areas;
6 a timing generator connected to said imager, and for applying timing signals to said
7 imager, wherein said timing signals include a first exposure signal for carrying out a first
8 exposure of a first time period, a second exposure signal for carrying out after said first exposure
9 a second exposure of a second time period, which is shorter than said first time period, a first
10 reading signal for reading-out from first light-receiving elements intermittently present in a
11 vertical direction out of said plurality of light-receiving elements to said vertical transfer register

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12 first electric charges generated by said first exposure, a second reading signal for reading-out
13 from second light-receiving elements respectively assigned to vacant transfer areas in which no
14 electric charge is present out of said plurality of light-receiving elements to said vertical transfer
15 register second electric charges generated by said second exposure, a vertical transfer signal for
16 transferring the electric charges read-out to said vertical transfer register in a vertical direction,
17 and a horizontal transfer signal for transferring in a horizontal direction the electric charges that
18 reaches said horizontal transfer register by a transfer in accordance with said vertical transfer
19 signal, and wherein said second light receiving elements are intermittently present in the vertical
20 direction, and said first electric charges read out by said first reading signal and said second
21 electric charges read out by said second reading signal are alternately arranged on said vertical
22 transfer register; and

23 a processor for generating one screen of a first image signal based on said first electric
24 charges and said second electric charges output from said imager;

25 an instruction key for inputting an imaging instruction; and

26 a shutter member arranged at a front surface of said imager, and for cutting-off an
27 irradiation of light into said imager; wherein said timing signal further includes a third exposure
28 signal output in response to an operation of said instruction key, and for carrying out a third
29 exposure of a third time period, a third reading signal for reading out from said plurality of light-
30 receiving elements to said vertical transfer register third electric charges generated by said third
31 exposure, a second vertical transfer signal for transferring in a vertical direction said third electric

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32 charges on said vertical transfer register, a second horizontal transfer signal for transferring in a
33 horizontal direction said third electric charges applied to said horizontal transfer register, a fourth
34 exposure signal for carrying out a fourth exposure after said third exposure, a driving signal
35 output after a fourth time period, which is different from said third time period, has passed since
36 a time of starting said fourth exposure, and for driving said shutter member, a fourth reading
37 signal for reading out fourth electric charges generated by said fourth exposure from said
38 plurality of light-receiving elements to said vertical transfer register after a completion of a
39 vertical transfer of said third electric charges, a third vertical transfer signal for transferring in a
40 vertical direction said fourth electric charges on said vertical transfer register, and a third
41 horizontal transfer signal for transferring in a horizontal direction said fourth electric charges
42 applied to said horizontal transfer register, and said processor generating one screen of a second
43 image signal based on said third electric charges and fourth electric charges output from said
44 imager.

1 Claim 23 (previously presented): A digital camera according to claim 22, further
2 comprising a recorder for recording said second image signal into a recording medium in a
3 compressed state.

Claim 24 (canceled):

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1 Claim 25 (currently amended): A digital camera according to claim 24, comprising:
2 an imager including a vertical transfer register having a plurality of transfer areas, a
3 horizontal transfer register connected to an output terminal of said vertical transfer register, and a
4 plurality of light-receiving elements respectively assigned to said plurality of transfer areas;
5 an exposure controller for controlling an exposure of said imager by using an electric
6 shutter system;
7 a reader for reading out from a portion of said plurality of light-receiving elements to said
8 vertical transfer register electric charges generated by an exposure of said exposure controller;
9 a vertical transferor for transferring in a vertical direction the electric charges read-out to
10 said vertical transfer register by said reader;
11 a horizontal transferor for transferring in a horizontal direction the electric charges that
12 reach said horizontal transfer register by a transfer of said vertical transferor, wherein said
13 exposure controller carries out a first exposure of a first time period, and carries out after said
14 first exposure a second exposure of a second time period, which is shorter than said first time
15 period, said reader reads out from first light-receiving elements intermittently present in a vertical
16 direction out of said plurality of light-receiving elements to said vertical transfer
17 register first electric charges generated by said first exposure, and reads out from second light-
18 receiving elements respectively assigned to vacant transfer areas in which no electric charge is
19 present out of said plurality of light-receiving elements to said vertical transfer register second
20 electric charges generated by said second exposure, and wherein said second light receiving

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21 elements are intermittently present in the vertical direction, and said first electric charges and
22 said second electric charges read out by said reader are alternately arranged on said vertical
23 transfer register; and

24 a generator for generating one screen of a first image signal based on said first electric
25 charges and said second electric charges output from said imager, wherein said second light-
26 receiving elements are equal to said first light-receiving elements, said reader reads out said
27 second electric charges to said vertical transfer register at the same time that a vertical transfer of
28 said first electric charges [[are]] is started or after the vertical transfer of said first electric charges
29 [[are]] is started.

1 Claim 26 (currently amended): A digital camera according to claim 25, wherein said
2 first light-receiving elements are ~~read-out~~ intermittently present in a vertical direction using
3 successive N ($N \geq 1$) of elements as one unit, and said vertical transferor moves said first electric
4 charges over a distance corresponding to at least N of the light-receiving elements until said
5 second electric charges are read-out.

1 Claim 27 (currently amended): A digital camera according to claim [[24]] 25, further
2 comprising a monitor for displaying an image based on said first image signal.

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1 Claim 28 (currently amended): A digital camera according to claim 24, further
2 comprising, comprising:
3 an imager including a vertical transfer register having a plurality of transfer areas, a
4 horizontal transfer register connected to an output terminal of said vertical transfer register, and a
5 plurality of light-receiving elements respectively assigned to said plurality of transfer areas;
6 an exposure controller for controlling an exposure of said imager by using an electric
7 shutter system;
8 a reader for reading out from a portion of said plurality of light-receiving elements to said
9 vertical transfer register electric charges generated by an exposure of said exposure controller;
10 a vertical transferor for transferring in a vertical direction the electric charges read-out to
11 said vertical transfer register by said reader;
12 a horizontal transferor for transferring in a horizontal direction the electric charges that
13 reach said horizontal transfer register by a transfer of said vertical transferor, wherein said
14 exposure controller carries out a first exposure of a first time period, and carries out after said
15 first exposure a second exposure of a second time period, which is shorter than said first time
16 period, said reader reads out from first light-receiving elements intermittently present in a vertical
17 direction out of said plurality of light-receiving elements to said vertical transfer register first
18 electric charges generated by said first exposure, and reads out from second light-receiving
19 elements respectively assigned to vacant transfer areas in which no electric charge is present out
20 of said plurality of light-receiving elements to said vertical transfer register second electric

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21 charges generated by said second exposure, and wherein said second light-receiving elements are
22 intermittently present in the vertical direction, and said first electric charges and said second
23 electric charges read out by said reader are alternately arranged on said vertical transfer register;
24 and
25 a generator for generating one screen of a first image signal based on said first electric
26 charges and said second electric charges output from said imager;

27 an instruction key for inputting an imaging instruction;
28 a shutter member arranged at a front surface of said imager, and for cutting-off an
29 irradiation of light into said imager; and
30 a driver for driving said shutter member, wherein said exposure controller carries out a
31 third exposure of a third time period in response to an operation of said instruction key, and starts
32 a fourth exposure after said third exposure, said reader reads out from said plurality of light-
33 receiving elements to said vertical transfer register third electric charges generated by said third
34 exposure, and reads out fourth electric charges generated by said fourth exposure from said
35 plurality of light-receiving elements to said vertical transfer register after a completion of a
36 vertical transfer of said third electric charges, said driver drives said shutter member when a
37 fourth time period, which is different from said third period, has passed since a time of staring
38 said fourth exposure, and said generator generates one screen of a second image signal based on
39 said third electric charges and said fourth electric charges output from said imager.

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Claim 29 (previously presented): A digital camera according to claim 28, further comprising a recorder for recording said second image signal into a recording medium in a compressed state.

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